Hope. A ring-micrometer was used, the aperture of the telescope and the unsatisfactory illuminating arrangements not permitting the use of the parallel-wire micrometer. The stars of comparison have been observed in the early morning with the meridian circle; also the 7½ mag. star used by Mr. Ellery on February 14. Mr. Gill expresses himself as by no means proud of his observations, the comet's nucleus being an object which could not be satisfactorily observed, but he did his best with the available means. He also writes disparagingly of the ring-micrometer, a tool which we incline to agree with him has been very much overlauded. As Mr. Gill will no doubt communicate the details of his observations and reductions to the Royal Astronomical Society or the *Astronomische Nachrichten*, we shall confine ourselves to appending his final results :—

	Cape M.T.	App. R.A.	App. N.P.D.
	h. m. s.	h. m. s.	° ′ ″
Feb. 10	8 50 2	0 3 58·59	
—	8 52 49	—	123 43 15·53
11	8 33 4	0 20 22·16	—
—	8 45 42	0 20 31·53	123 31 30·78
12	8 42 18	0 36 28·06	123 11 33·93
—	8 42 18	0 36 28·29	— 23·44
13	8 30 57	0 51 39·32	122 44 20·93
14	8 23 5	1 6 7·89	122 11 17·23
—	8 42 51	1 6 19·25	122 10 52·86
—	8 42 51	1 6 19·79	— 57·19
15	8 24 31	1 19 54·92	121 32 52·17

On February 12 two, and on February 14 three, comparison stars were employed. The observations are not yet corrected for parallax.

PHYSICAL NOTES

PROF. O. N. ROOD claims to have produced a *new* improvement into the Sprengel pump, by which he says he can easily exhaust to $\frac{1}{900000000}$ or $\frac{1}{1000000000}$. The alleged improvement is in two parts; the first being an arrangement whereby "the mercury, instead of being at once introduced into the pump, passes beforehand through an exhausted bulb"; the second being a "theoretically perfect fluid valve," formed by bending the fall-tube into a crenellated form at one point. It is hardly necessary to point out that neither of these improvements is new. The first has been adopted in the Sprengel pumps sold by instrument makers in London for the last ten years, and the second, in a form superior even to that of Prof. Rood (since the fall-tube was furnished with more than one fluid valve of a form identical with that devised by Prof. Rood), was to be seen in one of the improved Sprengel pumps exhibited in the Loan Collection at South Kensington in 1876.

M. TROUVÉ has suggested a new improvement in the old and simple longitudinal armature employed by Siemens in his earlier magneto-electric machines, and lately revived by M. Marcel Deprez in his little motors. M. Trouvé's improvement consists in constructing the armature, not with parallel sides, but with sides forming part of a skew-cylinder. Thus one part of the armature is ready to leave the poles of the field magnets when the other is approaching it, and the currents produced are therefore much more nearly continuous than with the parallel form. This will probably be a considerable advantage in the case where the armature is employed in a small motor, which will be driven much more steadily than has hitherto been possible. With three cells of Reynier's new battery this little motor will drive a sewing-machine.

M. J. PLATEAU proposes a method of estimating approximately the apparent distance at which the moon seems to different people to be in the sky. This means consists in looking at the moon steadily until the retina is sufficiently fatigued to produce an "accidental" image or ghost. The observer must then turn his gaze to a blank wall, on which he will see the accidental image projected as a tinted patch of the same shape as the moon. He is then to retreat from, or advance to, the wall until this image appears to him to be of the same size as the moon itself did. The distance measured off between the observer and the wall will be the same as that at which he unconsciously takes the moon to be. One of the sons of the author having made this experiment, found the distance to be in his case about fifty metres. This seems a small distance, but it was the result of a single experiment under circumstances which were not very favourable. M. Plateau concludes the brief memoir on the subject, presented by him to the Belgian Académie, by cautioning all persons who may be interested in the subject to take care in repeating the experiment lest the great brilliance of the luminary should damage their sight.

M. REYNIER recommends as a powerful and constant battery for electric light work a modified Daniells' cell, in which the zinc is immersed in a solution of caustic soda placed in a rectangular porous cell of parchment paper. The electromotive force of this combination varies from 1·47 to 1·35 volts, and the resistance may be less a Thomson's tray battery. The actual energy which a cell of this battery would furnish is calculated to be twice that of the ordinary round Bunsen cell.

A FEW months ago Prof. Boltzmann of Vienna published a calculation of the velocity of the electric current in a conductor based upon the discovery of Mr. E. H. Hall that a magnet acts upon a current in a conductor, tending to alter its path in the substance of the conductor. In the July number of the *American Journal of Science* Mr. Hall combats Boltzmann's calculation, and shows that by parallel reasoning a current should tend to urge forward with considerable force the conductor through which it flows; which mechanical effect is certainly non-existent. Mr. Hall now gives us the very interesting additional piece of information that the displacing force exercised by the magnet upon the current in the conductor is in an opposite direction in gold to what it is in iron—which is also quite irreconcilable with Boltzmann's theory.

AN improved centrifugal machine for schools is described in the *Nachrichten* of the Göttingen Society of Sciences (No. 9), by Herr W. Holtz. The driving-wheel runs in a vertical plane, and the quick axis may (with one and the same length of cord) be set either in a horizontal or a vertical plane, and higher or lower, also at varied distance from the frame of the machine; further, it can be so rotated that an object to be rotated with it can be suspended from it. On the same axis and of equal size with the large driving-wheel, but independent of it, runs another grooved wheel. The endless cord passes under these and round two smaller wheels higher up, one of which is on the axis to be quickly rotated (which is set in a movable support). The machine has been patented in Germany.

IN a communication to the Göttingen Society of Sciences (*Nachr.*, No. 13), Herr Wöhler states that with aluminium *alone* and with very few elements, a galvanic battery may be formed of strength sufficient to deflect a magnetic needle strongly, decompose water, and raise a thin platinum wire to glow. In a cylindrical glass vessel holding very dilute muriatic acid or dilute soda lye, is placed a roll of sheet aluminium, and within this a porous cell containing concentrated nitric acid and a smaller roll of aluminium. A projecting piece of the metal from each roll is inserted in a circular cover of ebonite.

DURING a recent thunderstorm at Hamburg the British Consul, Mr. Pogson, observed the phenomenon of St. Elmo's fire playing above the tip of the spire of a church three-quarters of a mile away. Twenty times within one hour a pale bluish ball of light resembling in tint the flame of burning potassium was seen. It appeared to be spherical in form, and from three to six feet in diameter. It seemed to hover above the spire without touching it, and lasting about forty seconds at each time of appearance.

Apropos of the approaching meeting of the British Association at Swansea, we may note that on the occasion of the last meeting at Swansea of the Association, in 1848, a paper was read by Mr. F. Wishaw "On the Telekouphon, or Speaking Telegraph." This antedates Philip Reis's "Telephon" by several years.

ANOTHER improved bichromate battery is announced, this time by the Silvertown Company. In no essential respect does this battery differ from the form known as "Fuller's battery," save in the addition of certain "exciting powders" to the liquids, a "grey compound" being dissolved in the inner cell in which the amalgamated zinc is placed, and a "red compound" in the outer cell with the carbon-rod. The use of dilute sulphuric acid is avoided by employing the "grey compound;" the avowed aim of this change is the increase of internal conductivity. The result is certainly an increase of cost.

SPEAKING of bichromate batteries, it appears to us that the true function of the porous cell now usually employed with them is entirely misunderstood. The bichromate solution, as reduced by the zinc in the cell on standing, is a colloidal substance. The

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porous cell prevents this from mixing with the fresher strong solution outside, and thus enables the operator to remove the exhausted portion.

AN adaptation of the telephone to the needs of deaf persons has been brought out by one H. G. Fiske of Springfield (Massachusetts). To the centre of the disk of the receiving telephone is attached a short rod of wood, ebonite, or other elastic hard material which can be held between the teeth. The sonorous vibrations imparted to the disk by the magnet are thus transmitted mechanically to the auditory nerves through the teeth and the bones of the skull. The advantages are probably limited, since, as experiments with the audiphone have shown, only a small percentage of truly deaf persons retain the power of hearing through the teeth. In the greater majority of cases it is the auditory nerve itself, not the mechanical adjustments and auditory apparatus of the ear, that is the cause of deafness.

GEOGRAPHICAL NOTES

SOME modifications have been made in the composition of the fifth International Expedition to Central Africa. Lieut. Harou, who was to have formed part of the expedition, will only join his companions at a later period on the Upper Congo. He is charged, meantime, with a secret mission to Africa, for the accomplishment of which about ten months are necessary. After the termination of this mission he will join the expedition. M. Harou will embark about the 23rd for his new destination. We learn that Dr. Dutrieux, who had to return from Africa to Belgium to recruit his health, is about to return to Africa to take part in the service for the abolition of slavery, at the head of which is Col. Sala. He had begun when in Africa a dictionary of the Suaheli language, so common all over Central Africa. Although incomplete, the Executive Committee of the Association have decided to print the dictionary as it is, and put it in the hands of travellers for correction and completion.

THE *Bereg* states that next autumn Baron Nordenskjöld will visit St. Petersburg to make preparations for his proposed expedition to the New Siberian Islands in 1882, the expenses of which will be borne by the Russian merchant, M. Sibiriakoff. Nordenskjöld will go to the mouth of the Lena overland, and thence embark for his destination.

THE Congress of French Societies of Geography was held this year at Nancy during the first week of August. M. Levasseur, honorary president, gave an address, in which he reviewed the progress realised by the creation of so many geographical societies. In the evening the members were invited to the Town Hall, where they were entertained by M. Volland, the mayor. A number of toasts were delivered by his Worship, as well as by M. Levasseur and others.

A LETTER from Dr. Matteucci, written in May last, intimates the arrival of the expedition under Prince Borghese at El Fasher, the capital of Darfur, and the approaching departure for Wadai. Dr. Matteucci remarks on the almost absolute want of water in Darfur, and the consequent recent cultivation of water-melons by the natives as far as the arid soil will permit. They also utilise the Baobab tree in a curious manner. Hollowing out the huge trunk of the older trees by fire, they by some prehistoric primitive method get the hollow trunk filled with water during the rainy season, the water keeping sweet for eight months. The people of Darfur, Dr. Matteucci says, are still in a primitive uncorrupted condition, a contrast to the Egyptianised natives of Kordofan.

M. BISCHOFFSHEIM pays the expenses of M. G. Capu, a young geologist and botanist, who will accompany M. de Ujfalvy on his new mission to Central Asia, referred to last week; M. Gabriel Bovalt, as topographer and naturalist, will also accompany the mission.

THE ALGÆ OF THE SIBERIAN POLAR SEA[1]

BEFORE the voyage of the *Vega* our knowledge of the algæ of the Siberian Polar Sea outside the Kara Sea was limited to the fact of their existence in Tschaun Bay and along the coast between that bay and the mouth of the Kolyma. This information was obtained by Baron Maydell, the leader of a scientific expedition sent out in 1869, under the auspices of the Russian Geographical Society, to explore the Tchuktchi Peninsula. A statement previously made by Matiuschin, one of Wrangel's companions during his Siberian journey, that algæ exist at Tschaun Bay, was thereby confirmed. Maydell brought home with him only three incomplete specimens of algæ, which he obtained from a native living at Cape Schelagskoj. From the description given by him they appear to belong to the genera Alaria and Laminaria.

From observations made during the voyage of the *Vega* it appears that algæ exist at several places along the whole coast of the Siberian Polar Sea. They occur almost exclusively within the sublittoral region. In the elittoral area, which was the best and most completely examined during the expedition, Dr. Kjellman found only at two places, viz., between Port Dickson and Tajmur Island, an exceedingly scanty flora consisting of three species, two Florideæ—*Lithothamnion polymorphum* and *Phyllophora interrupta*—and a Phæozoosporacea—*Lithoderma fatiscens*. The littoral region along the north coast of Siberia is, like that of the coasts of Novaya Zemlya and clearly for the same reasons, nearly everywhere devoid of algæ. Only at two places did Dr. Kjellman find traces of a strand vegetation. They consisted of two small green algæ, *Enteromorpha compressa* and *Urospora penicilliformis*, both known from the same region in other parts of the North Polar Sea. Fucaceæ occur nowhere within the littoral region, not a single individual of this group having been found at any of the places visited between Port Dickson and Koljuschin Fjord near Behring's Straits. To the east of this fjord there was found in the sublittoral region in limited quantity *Fucus evanescens*, which is extensively distributed in the North Polar Sea. In the sublittoral belt of the bottom, too, the vegetation in the Siberian Polar Sea is very scanty. Dr. Kjellman had not an opportunity of examining any region where the flora was not considerably poorer in individuals than in those places on the coasts of Spitzbergen and Novaya Zemlya where algæ are pretty abundant. The eastern portion of the sea appears to be somewhat less poor in algæ than the western. The places where they most abounded were Cape Irkajpij—Cook's North Cape (N. L. 68° 55′ W. L. 179° 25′), and the mouth of Koljuschin Fjord. From the natives settled between this fjord and Cape Serdze, situated about fifty miles to the east of it, Dr. Kjellman repeatedly obtained during the first half of 1879 very large masses of algæ, which appears to show that a pretty abundant vegetation of algæ is to be found at certain places along this part of the coast. There are not wanting, however, in the western part of the Siberian Sea some comparatively very good places for algæ. One such at least was found, viz., the region round Tajmur Island, between Port Dickson and Cape Chelyuskin.

The species that occurred most frequently were *Polysiphonia arctica*, *Rhodomela tenuissima*, a variety of *Rhodomela subfusca*, *Sarcophyllis arctica*, *Phyllophora interrupta*, species belonging to the family Laminarieæ, *Sphacelaria arctica*, and *Phloeospora tortilis*. The Laminarieæ give in general their stamp to the vegetation; at one place however *Phyllophora interrupta*, at another the above-mentioned variety of *Rhodomela subfusca* occurred in quantity surpassing that of the Laminarieæ.

Of this family six species were found, viz., four species of Laminaria: *L. Agardhii*, *L. cuneifolia*, *L. solidungula*, and one belonging to the digitata group, in which Dr. Kjellman believed that he recognised the *L. atro-fulva* of J. G. Agardh, and two species of Alaria, one standing near to *A. esculenta*, the other corresponding in much to *A. musæfolia*, but probably belonging each to species allied to these, and yet incompletely known, which occur in the north part of the Pacific. The distribution of the Laminaria along the north Siberian coast is different. *Laminaria solidungula* occurs both east and west of Cape Chelyuskin. *Laminaria Agardhii* was found only at that promontory and at a couple of places west, but nowhere east of it. Eastward it is replaced by *L. cuneifolia*, found first at Irkajpij and afterwards east of it in comparatively large quantities. Both the two species of Alaria and *Laminaria atro-fulva* appear also to be confined to the eastern portion of the Siberian Polar Sea. None of them were seen west of Irkajpij. Some of the species already mentioned as occurring most frequently enter into the composition of the vegetation in different proportions east and west of Cape Chelyuskin. *Polysiphonia arctica* and *Phyllophora interrupta* were more common west; *Rhodomela tenuissima* again more numerous east of the northernmost point of Asia. *Phloeospora tortilis* was nowhere seen east of Tajmur Island, nor *Sarcophyllis arctica* and the variety of *Rhodomela subfusca* west

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[1] Abstract of preliminary communication by Dr. F. R. Kjellman in "Ofvers. af Kongl. Vet. Akad. Förhandl.," 1879.

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